

The University of Chicago

THE EMOTIONAL RESPONSES OF
CHILDREN TO RADIO DRAMA

A PART OF A DISSERTATION SUBMITTED TO
THE FACULTY OF THE DIVISION OF THE
SOCIAL SCIENCES IN CANDIDACY FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATION

1938

By

JOHN JAMES DE BOER

Private Edition, Distributed by
THE UNIVERSITY OF CHICAGO LIBRARIES
CHICAGO, ILLINOIS

1940

The University of Chicago

THE EMOTIONAL RESPONSES OF
CHILDREN TO RADIO DRAMA

A PART OF A DISSERTATION SUBMITTED TO
THE FACULTY OF THE DIVISION OF THE
SOCIAL SCIENCES IN CANDIDACY FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATION

1938

By

JOHN JAMES DE BOER

Private Edition, Distributed by
THE UNIVERSITY OF CHICAGO LIBRARIES
CHICAGO, ILLINOIS

1940



CHAPTER III

PURPOSE AND METHODS OF THE STUDY

Purpose of the Present Study

The purpose of the present study is two-fold: first, to determine the general effects of radio drama upon the emotions of children, and second, to identify the basic "satisfiers" in radio drama, or elements of satisfaction as revealed by children's emotional responses.

Methods Employed in the Study

The most obvious and most direct method of discovering the responses of children to radio programs is to ask the children themselves what they like and what they do not like in radio. The first step in the investigation, therefore, was to draw up a questionnaire concerning children's preferences and listening habits. Opportunity was provided the children participating in the study to report their favorite programs, their favorite radio performers, their favorite types of programs, the hour of day and time spent in listening to the radio, and other habits connected with radio listening. Records were secured for seven hundred and thirty-eight children from all grades of six Chicago elementary schools. In the case of pupils in grades one and two the questionnaires were filled out by the writer and his student assistants in individual interviews with the children. In the upper grades the questionnaires were personally administered to entire classes. Pupils were not asked to sign their names, although most of them voluntarily supplied signatures.

When the pupil responses had been tabulated, a number of important limitations of the accumulated evidence became apparent. The pupils were obliged to depend upon memory for their responses to the questions, and it is likely that many pupils overlooked programs to which they listened with pleasure, particularly in the case of those who reported fairly long lists. Others undoubtedly reported some programs simply because they were known to be popular

among their fellows. But most important was the fact that the data offered few clues as to the reasons for the children's expressed preferences. Obviously there was need for a more analytical approach to the problem of children's responses to the radio.

The second phase of the investigation, therefore, represented an effort to discover the specific narrative and situational elements which contributed to the "emotional potential" of a given radio program. An opportunity for study of this phase of the problem was afforded through the coöperation of Mr. Norman Alexandroff, a Chicago radio producer, who set up a portable studio for use in the schools, assembled a cast of radio players, and personally directed the production of the radio "shows." The chief advantage of this plan was that a given program could be repeated as often as necessary for experimental purposes, and especially that it could be varied in wording, tempo, intensity, and plot. In later experiments during the course of this phase of the investigation, arrangements were made with a WPA group broadcasting a series of programs for adults, known as "It Happened on State Street," from radio station WCFL, in Chicago. Scripts of the programs to be broadcast were secured beforehand and used in the classrooms where the programs were picked up by a commercial receiving set.

The first procedure, in the recording of the children's responses, was to employ a modified form of the Morrison technique for measuring group control.¹ By means of this device the number of children who were in attention during every half-minute of a program could be recorded. Passages in the script were identified according to the percentage of pupils in attention during the corresponding section of the radio play.

The children's responses during this experiment suggested a more selective method of identifying the passages of greater "emotional potential." The children used for the first experiment ranged from age five to age eight. Their response to the program took the form of vigorous physical movements, shouts, laughter, repetition of sounds heard in the program, and dramatization of the action of the story. In subsequent experiments, therefore, observers (college students) were assigned to the pupils for the purpose of recording children's overt responses to the successive passages

¹Henry C. Morrison, The Practice of Teaching in the Secondary School, p. 117. Chicago: The University of Chicago Press, 1927.

of the radio plays. The groups of children assigned to a single observer ranged in number from one to eight. Observers had copies of the scripts before them, and made their entries upon separate report blanks in the earlier experiments, and upon the scripts directly in the later experiments. Observers rated the various passages according to a scale constructed on the basis of the types of physical response observed.

Summaries of the observers' ratings of the passages were instrumental in classifying the elements of situation and dialogue found in the various juvenile and adult programs used in the experiments. Those which were rated highest by a majority of observers constituted by this test the "basic satisfiers." This phase of the study, which represented a fairly large scale application of an observational technique, proved valuable chiefly as an experiment in procedure, which should be followed by similar experiments with more refined technique.

The purpose of the third phase of the study was to discover, by means of mechanical techniques developed in psychological laboratories, some of the physiological changes, commonly associated with emotional disturbances, which occurred in children during the presentation of the radio programs. While this procedure had the disadvantage of requiring experimentation with a single child at a time, it apparently had the advantage of much greater objectivity than was afforded by the observational technique, and it revealed physical phenomena not apparent to the observer. For these experiments electrical transcriptions of radio programs were more satisfactory than programs taken directly from the air, because the recordings could be repeated indefinitely with different subjects for purposes of comparison. They were superior also to the independent experimental broadcasts used in the early experiments with student observers, because the preparations required for a single experimental broadcast would have been extravagant, if not prohibitive, when only one subject could be used in an experiment. A number of advertising agencies kindly furnished both scripts and transcriptions of episodes from juvenile radio series.

The specific responses measured in the laboratory experiments included pulse, blood pressure, respiration, and the electrodermal response. The apparatus, described in detail in a later chapter, was similar in important respects to that used by Dysinger and Ruckmick in the Payne Fund studies of the effects of motion

pictures on children, and to certain parts of the Darrow Behavior Research Photopolygraph. The experiments were conducted in the laboratories of the Department of Education of the University of Chicago.

The children used in these experiments ranged in age from eight to sixteen. Their responses, recorded photographically upon strips of sensitized paper, were tabulated and made the basis for a classification of elements of incident and dialogue on the basis of emotional potential, as in the case of the experiments with student observers.

Summary of Techniques Employed

The present investigation of the emotional reactions of children to radio drama proceeded through three distinct stages, in each of which a different technique was employed. The three phases were:

- (1) A tabulation of children's preferences in radio programs as determined by questionnaire responses and interviews.
- (2) The observation of children's overt responses in group listening to radio programs.
- (3) The use of mechanical measures of pulse, blood pressure, respiration, and electrodermal response of individual children listening to radio programs.

Three methods of presenting the radio programs were employed:

- (1) Special broadcasts from a portable radio studio set up in various elementary schools.
- (2) Regular studio broadcasts from a radio station, from which actors' scripts were secured in advance.
- (3) Electrical transcriptions of well-known children's programs, which were repeated for different children for purposes of comparison.

CHAPTER IV

CHILDREN'S PREFERENCES IN RADIO PROGRAMS

Purpose of the Study of Children's Preferences

The first stage of the investigation was a study of children's preferences in radio programs as determined by a tabulation of the programs to which they habitually listened. The immediate purpose of this study was to approach the problem of emotional reactions to radio programs through the discovery of the changing tastes of children from age six to age fourteen, differences in preferences of boys and girls, types of programs preferred, types of radio dramas preferred, radio characters enjoyed most, and the amount of time spent in listening to the radio. An analysis of the elements in a radio presentation to which children respond emotionally was to be based upon the data gathered in this inquiry.

Method of the Investigation

A mimeographed questionnaire was distributed during school hours to seven hundred and thirty-eight pupils in grades one to eight in the Parker, Wentworth, Ray, Barnard, Trumbull, and Spencer elementary schools of Chicago, Illinois. In grades above the third pupils were asked to fill in the answers, one at a time, as the writer or a college student specifically trained for this work read the questions to the class. Pupils were not required to sign the questionnaires. In the primary grades, the blanks were filled in by the writer or his assistants during personal interviews with individual children.

Range of Children's Preferences

Table 6, which lists all the programs reported by the seven hundred and thirty-eight children participating in the study, suggests the best range of children's preferences. The programs include series addressed to the very young child, to older children

TABLE 6

PROGRAMS TO WHICH CHILDREN IN ALL
GRADES LISTEN REGULARLY

Program	Boys	Per Cent	Rank	Girls	Per Cent	Rank	Total	Per Cent	Rank
Lone Ranger	242	66	1	205	59	2	447	63	1
Orphan Annie	184	50	2	245	71	1	429	60	2
Jack Armstrong ...	172	47	3	101	29	4	273	38	3
Major Bowes	67	18	6	104	30	3	171	24	4
Jimmy Allen	111	30	4	40	12	11	151	21	5
Popeye	74	20	5	64	18	8	138	19	6
Singing Lady	48	13	12	89	26	5	137	19	7
Burns and Allen ..	46	13	13	82	24	6	128	18	8
Buddy and Ginger ..	60	16	8	61	18	9	121	18	9
Jack Benny	49	13	11	65	19	7	114	16	10
Buck Rogers	64	17	7	47	14	10	111	16	11
Flying Time	59	16	9.5	29	8	15	88	12	12
Eno Crime Clews ..	59	16	9.5	21	6	27	80	11	13
Lum and Abner	41	11	15	29	8	15	70	10	14
Ripley	32	9	18.5	34	10	12	66	9	15
Dick Tracy	43	12	14	21	6	27	64	9	16
Barn Dance	32	9	18.5	30	9	13	62	9	17
Eddie Cantor	33	9	17	27	8	18	60	8	18
First Nighter	24	7	22	29	8	15	53	7	19
Gang Busters	40	11	16	9	3	41	49	7	20
Death Valley Days.	27	7	21	21	15	27	42	6	21
20,000 Years in Sing Sing	29	8	20	12	4	36.5	41	6	22
Easy Aces	17	5	31	23	7	22.5	40	6	23
Kaltenmyer's Kin- dergarten	14	4	32.5	28	8	17	39	6	24
Scoop Ward	20	5	26.5	18	5	29.5	38	5	25
Jolly Joe	14	4	32.5	23	7	22.5	37	5	26.5
Amos and Andy	23	6	23	14	4	32.5	37	5	26.5
Lux Radio Theater.	11	3	36.5	22	6	24.5	33	5	28.5
Myrt and Marge ...	8	2	42	25	7	19.5	33	5	28.5
Renfrew	20	5	26.5	10	3	39.5	30	4	30
The Goldbergs	7	2	45.5	22	6	24.5	29	4	31.5
Junior Nurses	4	1	63.5	25	7	19.5	29	4	31.5
Betty and Bob	4	1	63.5	24	7	21	28	4	33
Captain Tim	21	6	24	5	1	51	26	4	34
Tom Mix	20	5	26.5	5	1	51	25	4	35
March of Time	19	5	29.5	5	1	51	24	3	37
New Penny	8	2	42	16	5	31	24	3	37
Flash Gordon	20	5	26.5	4	1	62.5	24	3	37
Jimmy Mattern	19	5	29.5	4	1	62.5	23	3	39
Hollywood Hotel ..	4	1	63.5	18	5	29.5	22	3	40
Spareribs	7	2	45.5	14	4	62.5	21	3	42
Show Boat	8	2	42	13	4	62.5	21	3	42
One Man's Family ..	8	2	42	13	4	62.5	21	3	42
Uncle Bob	5	1	55	12	4	36.5	17	2	44.5
Og, Son of Fire ..	13	4	34.5	4	1	62.5	17	2	44.5
Lights Out	13	4	34.5	2	1	90	15	2	47
Pick and Pat	10	3	38	5	1	51	15	2	47
Grand Hotel	4	1	63.5	11	3	38	15	2	47

TABLE 6--Continued

Program	Boys	Per Cent	Rank	Girls	Per Cent	Rank	Total	Per Cent	Rank
True Story	6	1	50.5	8	2	42.5	14	2	49
Fred Allen	7	2	45.5	6	2	44	13	2	50.5
Black Magic	8	2	42	5	1	51	13	2	50.5
Topsy Turvy Time ..	4	1	63.5	8	2	42.5	12	2	52.5
Shell Chateau	9	2	39	3	1	73	12	2	52.5
Baseball	11	3	36.5	...	...	....	11	2	55
Skippy	1	..	114	10	3	39.5	11	2	55
Fibber McGee	6	2	50.5	5	1	51	11	2	56
Boake Carter	7	2	45.5	2	1	90	9	1	60.5
Roses and Drums ..	7	2	45.5	2	1	90	9	1	60.5
Witch's Tale	5	1	55	4	1	62.5	9	1	60.5
Bing Crosby	5	1	55	4	1	62.5	9	1	60.5
Rudy Valee	4	1	63.5	5	1	51	9	1	60.5
Joe Penner	4	1	63.5	5	1	51	9	1	60.5
Kate Smith	4	1	63.5	5	1	51	9	1	60.5
News	4	1	63.5	5	1	51	9	1	60.5
Sherlock Holmes ..	7	2	45.5	1	...	121	8	1	65.5
Fred Waring	6	2	50.5	2	1	90	8	1	65.5
Mennen's Jury Trials	5	1	55	2	1	90	7	1	68.5
Ben Bernie	3	1	73	4	1	62.5	7	1	68.5
Behind the Camera Lines	2	1	84.5	5	1	51	7	1	68.5
Toytown Band	2	1	84.5	5	1	51	7	1	68.5
Opera	6	2	50.5	...	...	....	8	1	74
Cavalcade of America	5	1	55	1	...	121	6	1	74
Funnies	4	1	63.5	2	1	90	6	1	74
Trading Post	3	1	73	3	1	73	6	1	74
Symphony	3	1	73	3	1	73	6	1	74
Phillips 66	2	1	84.5	4	1	62.5	6	1	74
Palmolive	1	...	114	5	1	51	6	1	74
Herr Louie	3	1	73	2	1	90	5	1	81
Kraft Hour	2	1	84.5	3	1	73	5	1	81
Sentimental Selma.	2	1	84.5	3	1	73	5	1	81
Grace Moore	2	1	84.5	3	1	73	5	1	81
Grandpa Burton ...	2	1	84.5	3	1	73	5	1	81
Mary Marlin	1	...	114	4	1	62.5	5	1	81
Ma Perkins	1	...	114	4	1	62.5	5	1	81
Sinclair Minstrels	4	1	63.5	...	...	....	4	1	88
Camel Caravan	4	1	63.5	...	...	....	4	1	88
Jack Hilton	2	1	84.5	2	1	90	4	1	88
The O'Malleys	2	1	84.5	2	1	90	4	1	88
Vic and Sade	2	1	84.5	2	1	90	4	1	88
Milky Way	1	...	114	3	1	73	4	1	88
Sachs' Amateur Hour .....	...	...	....	4	1	62.5	4	1	88
Dick Powell	3	1	73	...	...	....	3	...	98.5
Murder Stories ...	3	1	73	...	...	....	3	...	98.5
Sports	3	1	73	...	...	....	3	...	98.5
George and Gene ..	2	1	84.5	1	...	121	3	...	98.5
Ma and Pa Smithers	2	1	84.5	1	...	121	3	...	98.5

TABLE 6--Continued

Program	Boys	Per Cent	Rank	Girls	Per Cent	Rank	Total	Per Cent	Rank
Dorothy Hunt .	1	...	114	2	1	90	3	...	98.5
Couple Next									
Door	1	...	114	2	1	90	3	...	98.5
Stamp Club ...	1	...	114	2	1	90	3	...	98.5
Girl Alone ...	1	...	114	2	1	90	3	...	98.5
Palmer House .									
Ensemble	1	...	114	2	1	90	3	...	98.5
Phil Baker ...	1	...	114	2	1	90	3	...	98.5
After Dinner									
Frolics	...	...	...	3	1	73	3	...	98.5
Virginia Lee .	...	...	...	3	1	73	3	...	98.5
Aladdin's Lamp	...	...	...	3	1	73	3	...	98.5
Hotan Tanka ..	2	1	84.5	...	...	...	2	...	116.5
Vox Pop	2	1	84.5	...	...	...	2	...	116.5
Rich Man's									
Darling ,,,...	2	1	84.5	...	...	...	2	...	116.5
Life of Red									
Horse Ranch..	2	1	84.5	...	...	...	2	...	116.5
Titans of Science	2	1	84.5	...	...	...	2	...	116.5
Strange As It Seems	2	1	84.5	...	...	...	2	...	116.5
Back Stage									
Wife	1	...	114	1	...	121	2	...	116.5
Gail and Don..	1	...	114	1	...	121	2	...	116.5
Bob Becker ...	1	...	114	1	...	121	2	...	116.5
Widow's Son ..	1	...	114	1	...	121	2	...	116.5
Children's									
Program	1	...	114	1	...	121	2	...	116.5
Tiny Tim	1	...	114	1	...	121	2	...	116.5
Fairy Tales ..	1	...	114	1	...	121	2	...	116.5
Jan Garber ...	1	...	114	1	...	121	2	...	116.5
Ed Wynn	1	...	114	1	...	121	2	...	116.5
Just Plain									
Bill	...	...	...	2	1	90	2	...	116.5
Mother Monahan	...	...	...	2	1	90	2	...	116.5
Painted Dreams	...	...	...	2	1	90	2	...	116.5
Today's Children	...	...	...	2	1	90	2	...	116.5
Old Heidelberg	...	...	...	2	1	90	2	...	116.5
Silver Penny..	...	...	...	2	1	90	2	...	116.5
Lucky Girl	...	...	...	2	1	90	2	...	116.5
Morning Minuet	1	...	114	...	...	...	1	...	151
Bill Davis ...	1	...	114	...	...	...	1	...	151
Tony, the									
Barber	1	...	114	...	...	...	1	...	151
Nursery Rhymes	1	...	114	...	...	...	1	...	151
Ghost Trail ..	1	...	114	...	...	...	1	...	151
Moody Bible									
Institute ...	1	...	114	...	...	...	1	...	151
Jolly Rogers .	1	...	114	...	...	...	1	...	151
Frank Buck ...	1	...	114	...	...	...	1	...	151
The Shadow ...	1	...	114	...	...	...	1	...	151

TABLE 6--Continued

Programs	Boys	Per Cent	Rank	Girls	Per Cent	Rank	Total	Per Cent	Rank
Radio Patrol	1	...	114	...	...	...	1	...	151
Dan, The Milkman..	1	...	114	...	...	...	1	...	151
Buffalo Bill	1	...	114	...	...	...	1	...	151
Twilight Story ...	1	...	114	...	...	...	1	...	151
Jack Forrester ...	1	...	114	...	...	...	1	...	151
Musical Clock	1	...	114	...	...	...	1	...	151
Nickolodeon	1	...	114	...	...	...	1	...	151
Ruby Keeler	1	...	114	...	...	...	1	...	151
Eleanor Powell ...	1	...	114	...	...	...	1	...	151
Mel Hunt	1	...	114	...	...	...	1	...	151
Hammerstein's									
Music Hall	1	...	114	...	...	...	1	...	151
Secret Three	1	...	114	...	...	...	1	...	151
Mary Southern	...	...	...	1	...	121	1	...	151
Guy Lombardo	...	...	...	1	...	121	1	...	151
Headless Rider ...	...	...	...	1	...	121	1	...	151
Irma Glenn	...	...	...	1	...	121	1	...	151
Magic Key	...	...	...	1	...	121	1	...	151
Wieboldts	...	...	...	1	...	121	1	...	151
Musical Varieties.	...	...	...	1	...	121	1	...	151
Tale of Today	...	...	...	1	...	121	1	...	151
Ozzie Nelson	...	...	...	1	...	121	1	...	151
Lily Pons	...	...	...	1	...	121	1	...	151
While The City									
Sleeps	...	...	...	1	...	121	1	...	151
Armchair Melodies.	...	...	...	1	...	121	1	...	151
Jolly Juniors	...	...	...	1	...	121	1	...	151
John and Jack	...	...	...	1	...	121	1	...	151
KYB Club	...	...	...	1	...	121	1	...	151
Clara, Lu and Em .	...	...	...	1	...	121	1	...	151
Hen Patter	...	...	...	1	...	121	1	...	151
Peter Pan	...	...	...	1	...	121	1	...	151
Wayne King	...	...	...	1	...	121	1	...	151
Mollie of the									
Movies	...	...	...	1	...	121	1	...	151
Dick Steele	...	...	...	1	...	121	1	...	151
Firestone	...	...	...	1	...	121	1	...	151
Walter Damrosch ..	...	...	...	1	...	121	1	...	151
Mary Pickford	...	...	...	1	...	121	1	...	151
Albert Terhune ...	...	...	...	1	...	121	1	...	151
Amateur Hour.....	...	...	...	1	...	121	1	...	151

and to adults. They include variety numbers, humor of various types, Western stories, adult drama, character studies, mystery and crime stories, boy and girl adventure, dramatizations of the lives of famous characters, historical dramatizations, dance music, vocal music, band music (including crooners), baseball games, sports news, court trials, dramatizations of domestic tragedies, small talk,

news commentators, religious programs, and dramatizations of scientific discoveries. For individual children, the range varied widely, some children listing as many as fifteen programs, others only one or two.

Summary and Conclusions

Children are interested in a vast range of types of radio programs. Few radio programs, however, possess such universality of appeal as to appear on the lists of preferences of a large number of children. It is interesting to note that only thirteen of the 174 programs listed in this study were mentioned by more than ten per cent of the children. Programs which had a large appeal to boys and girls on all the grade levels of the elementary school included both adult and children's programs, humor, mystery, adventure, aviation, and musical variety programs. None of the children's programs was of the humorous type, but certain of the adult programs preferred contained a form of humor. Crime, mystery, and horror stories are not popular on any grade level. Certain "early juvenile" programs, such as the "Singing Lady" and programs describing the adventure of very young child characters, had a strong appeal to children in the early years, but very little to children in the middle and upper grades. Both boys and girls expressed strong preference for adventure stories, but boys preferred stories with a boy character as hero while girls preferred the leading character to be a girl. Boys and girls of all ages expressed enthusiastic preference for the adult adventure series, the "Lone Ranger." With the coming of adolescence, there appeared, in addition to the adult and child adventure preference, a strong interest in serious adult drama dealing with romance. The older girls developed a marked preference for adult humor programs and dance music. All children tended to prefer amateur hour or variety programs.

The data presented in this chapter deal primarily with interests, not with emotional reactions. Yet such information as may be derived from children's voluntary choices in radio listening will throw valuable light upon the problem of the emotional factors involved in the radio listening situation. Interests are the result of conditioning of primitive reactions--sometimes of sheer imitation of behavior patterns of adult or child companions. For the educator it is important to know what are the basic consistent emotional responses and how the element of rationality, reflective

thinking, broad informational background, social responsibility, outlook upon life, and the like, may modify these emotional responses.

CHAPTER V

PURPOSE AND PROCEDURES OF THE EXPERIMENTS

Purpose of the Experiments in Direct Observation

The limitations of the questionnaire study of children's preferences in radio programs suggested the need for a direct, analytical study of children's emotional responses to radio programs. A number of experiments in which children's overt reactions were to be systematically observed were accordingly planned.

The purpose of these experiments, outlined briefly in Chapter III and described in detail in the following pages, was to discover what types of radio drama and what types of specific situations in the radio plays elicit vigorous affective responses from children.

Procedures Followed in the Experiments

Two series of experiments with direct observational techniques were employed. The first series was conducted with children in the primary and middle grades, utilizing special equipment and staffs for school broadcasting of the radio dramas. The second series was conducted with children in the seventh and eighth grades, utilizing adult programs broadcast from a Chicago radio station.

Radio equipment consisting of an acoustical tent, radio amplifier, portable microphone, phonograph turntable and pickup for reproduction of recorded sound effects, electrical transcriptions of sounds to be introduced in the programs, other devices for the production of sound effects, and a large loudspeaker with sounding board was first set up in a private North Shore school affiliated with the Pestalozzi-Froebel Teachers College. The "broadcasting" apparatus was set up in an attic room of the school building, the program being carried by cable to the loudspeaker in the assembly room where twenty-eight children of the primary grades had gathered. The school building had formerly been a private residence, and the "assembly room," with its rugs and fireplace

and homelike furniture, retained all the appearance of a comfortable living room. The children were grouped around the loudspeaker the majority sitting informally on the floor. With the exception of the large number of auditors, the situation was as nearly normal for radio listening as could be expected.

The staff required for this and subsequent experiments consisted of an experienced radio producer who directed the "broadcast," three professional radio performers who acted as announcer or took leading rôles in the production, a large number of students from a local school of speech, for major and minor rôles, and varying numbers of observers. The radio script used in the first experiment had been planned coöperatively by the director of the radio production, the president of the college, and the writer.

Two college students who had previously been instructed in the use of the Morrison method¹ of measuring group control sat in different parts of the room to observe the responses of the group. Each student was provided with a stop watch, notebook leaves marked out with spaces for the entries called for by Morrison's device, and a pencil. The forms, illustrated in Table 19, made provision for entries for each half-minute of the program. A third student held in her hands a copy of the script and a stop watch with the aid of which she noted the passage of the half-minutes on the pages of the script. It was thus possible to identify the passages in the radio program which interested or failed to interest a large number of children. A fourth was asked to record overt responses observed or remarks overheard in the course of the program. At the close of the program, when the children had returned to their rooms, they were asked to fill in the blanks of an objective test given to determine their comprehension of the story. Questionnaires were sent also to the parents with inquiries as to the remarks made by the children upon their arrival home at noon (the program was given directly before the noon hour).

The second experiment was conducted in the school of the Marshall Field Garden Apartments on Chicago's North Side, also a primary school connected with the Pestalozzi-Froebel Teachers College. The equipment and physical setting were similar to those in the first experiment. Again the ages of the pupils ranged from five to eight. This time the Morrison method for measuring group

¹Henry C. Morrison, op. cit., p. 117.

control was abandoned, chiefly because it made no provision for the recording of any responses more vigorous than mere attention. In this experiment the observers were given loose-leaf notebooks containing copies of the scripts of the radio programs presented, with a record sheet placed opposite each page of the scripts. For purposes of observation the children were divided into groups of ten, each group being assigned to a pair of observers. Observers were asked to record opposite the passage in the script, line by line, the type of emotional response observed. They were asked to note what kind of movement the pupil made, what changes took place in his facial expression. Two scripts were used in this second experiment--A1, The Runaway Dog, and B1, The Space Ship.

The third experiment was carried on with a larger number of children in the Parker Practice School, on the campus of the Chicago Normal College. The equipment, the producing staff, and the programs used were the same as those used in the preceding experiments. The Kuhlmann-Anderson test of mental ability was given to three divisions of pupils in grade 1A. Three groups of children, consisting of twenty-four boys and girls each and matched according to their performance on this test, were organized and presented successively with Script A1. In order to test the relative effectiveness of certain factors of dramatic direction in eliciting emotional responses from the children, the program was given to the first group with normal sound and tempo, to the second without sound effects, and to the third with heightened sound effects and accelerated tempo.

An attempt was made in this experiment to secure a detailed and circumstantial record of the overt motor responses of the children to the various passages of the program. Twenty-four students from the Chicago Normal College, many of them college graduates, were asked to serve as observers. One observer was assigned to each of the children in the group. The records were kept in large looseleaf notebooks containing copies of the script of the program and record blanks opposite each page of the script. All scripts were marked to indicate the precise passages opposite which notations were to be made as to the overt motor responses of the children under observation. The observers, who had been given specific instructions as to their duties beforehand, seated themselves about the room in positions from which observation of the assigned pupils was most convenient. The pupils in each of the three groups were

numbered from one to twenty-four, in the order of their performance on the test of mental ability. Each observer was assigned to pupils occupying an equivalent position, in the three groups. Thus observer A was assigned to pupil one in group A, pupil one in group B, and pupil one in group C. By this means it was possible to compare the responses of the three pupils for whom each observer kept a record. At least the factor represented by the observer was kept constant.

A disadvantage of this procedure was the difficulty of deriving generalizations from the nearly thousand sheets of raw data submitted by the observers at the end of the experiment. It was evident that for the sake of economy of effort some method would have to be devised to secure a more concise record, one that would lend itself to numerical summary. Observers were therefore called into conference before the fourth experiment and asked to report those emotional responses which in their opinion could be readily recognized and recorded. They listed the following responses: interest (ordinary attentiveness); laughter, happiness, eagerness, fear, anxiety, excitement, relief, indifference, dramatization, disappointment. These responses were numbered and listed to the left of the observers' forms. The observers' forms were simplified and condensed by means of the division of the page into columns for the entries on each of the children to be observed during the successive programs of the experiment. Observers were now asked to record, not the specific details which they observed in children's responses, but merely the numbers designating the general classification of the responses noted.

Thirty children from grade 1B of the Parker Practice School, divided into three groups equated with the aid of the Kuhlmann-Anderson test of mental ability, were used in the fourth experiment. The script used was again The Runaway Dog, and the three performances, each with a new group of ten children, were varied once more to determine the effect of the introduction of sound effects and of the acceleration of tempo. Group A heard the program with sound effects, Group B heard it without sound effects, and Group C heard it with heightened sound and increased tempo.

In order to classify the various passages of the script according to the amount of interest they had apparently aroused, a system of weighting by means of which numerical values might be assigned to the various passages was introduced. Passages reported

to have aroused ordinary attentiveness were given a value of one; those producing various changes in facial expression were given a value of two; and those calling forth general physical movements were given a value of four. The average score assigned to a passage by all the observers in the experiment was taken as the "index of satisfaction." A retention test was given to the pupils the day following the program.

Essentially similar procedures were employed in the remaining experiments of the series. In experiment five, conducted with pupils in grade 5B of the Parker Practice School, both script A1 and script B1 were used, each being given to two separate groups of children. Each of the nine observers was asked to keep a record of the responses of a single pupil. A retention test on the contents of the radio story was administered to this class the following day.

Comparison of script A1 with a new script, called B2 (a routine "Wild West" story), was made in the sixth experiment, conducted with two 4A classes in the Parker Practice School. In the seventh experiment another new script, called A2 (based on authentic details of aviation in the American coast guard service), was compared with script B2 with respect to the responses of 6A pupils. The eighth, and final, experiment in this series consisted of the presentation of script A2 to a group of 5A pupils.

The four experiments in the second series were conducted in seventh and eighth grade classes with programs broadcast from the studios of Chicago's labor station WCFL, and presented to the children from receiving sets placed in the classrooms. Scripts for the programs were secured in advance through the coöperation of the director of the WPA players producing the programs. As in the experiments of the first series, the student observers were supplied with looseleaf notebooks, each of which contained a mimeographed copy of the script, with an observer's record blank placed opposite each page of the script. At the close of each experiment the blanks containing the entries were removed from the notebooks, clipped together and labeled, and later summarized and compared.

Scripts Used in The Experiments

In this first series of experiments, four specially prepared scripts were employed. They were designated A1 (The Runaway Dog), A2 (Lost in The Storm), B1 (The Space Ship), and B2 (The Call

of The West). The first two of these were written jointly by Mr. Alexandroff, Mr. Hegner, and the writer. The second was prepared by Mr. Alexandroff and Mr. Hegner, in consultation with coast guard officials, who supplied authentic details for the narrative. The third was modeled rather directly upon an episode from a commercial series broadcast at the time of the experiments. Only the names of the characters were changed. The fourth script was written by a professional writer of children's plays for the radio.

The scripts for the second series of experiments, broadcast from station WCFL and known as the "W" scripts, were written by a WPA writer, who borrowed rather generously from radio plays currently presented on local stations. Summaries of the scripts, with the reading points indicated, are presented in the Appendix.

CHAPTER IX

SUMMARY AND CONCLUSIONS

A Descriptive Summary of Children's Emotional Responses to Radio Drama as Determined by Direct Observation Method

The groups of children observed differed widely with respect to the degree of restraint exhibited in the expression of emotions during the radio programs. Perhaps one of the most important contributing factors was the nature of the social situations in which children listened to the programs. Least restrained of all the groups were the children in the primary grades. Some of these children, it is true, appeared oblivious to their surroundings. They stared into space with a facial expression denoting anxiety or relief, or went through elaborate motions dramatizing the action of the story with no apparent consciousness of being observed by any one, certainly without being noticed by their fellows. Others, however, appeared keenly aware of the presence of their associates. As they smiled, squealed, or chuckled over the actions or the humorous dialogue of the radio story, they turned to each other as though to share their pleasure. At other times, when the story portrayed a minor crisis in the action, these children looked at each other in obvious alarm over the turn of events. Possibly in some instances the responses were induced sympathetically by the responses of other children.

Greater restraint was noted in the case of the upper grade pupils. In the case of the seventh and eighth grade pupils the overt motor responses were confined to changes in facial expression and occasional meeting of glances. The changes in facial expression were much less frequent than they were among the younger children, during both the juvenile and the adult programs presented. In the danger situations the expression of anxiety or concern was markedly less intense, and in the humor and solution situations the expression of relief and of laughter less accentuated. The only positive evidence of the social factor in the inhibition or stimulation of overt responses appeared during the love scenes,

when both boys and girls smiled and giggled and seemed self-conscious.

In general, there appears to be a progressive decrease in the intensity of the emotional response to the radio narrative as the children grow older. The younger children, particularly those in the age group from six to eight, identify themselves closely with the characters in the story. In situations of danger, combat, pursuit, flight, and threats to the possession of some treasured object, both boys and girls in this age group respond by gripping some article of furniture tightly, gasping, chuckling involuntarily, sobbing, laughing, and weeping quietly. All give evidence of happiness and apprehension in the various situations presented in the radio story. The older children, particularly those in the age group from twelve to fourteen, tend to objectify the narrative to which they are listening and to regard it as entertainment rather than a series of incidents directly affecting themselves. They appear more capable of distinguishing fact and fancy.

Situations producing laughter varied from humorous dialogue to violent combat, rescue, and the warding off of danger. In situations evoking laughter but containing no element of humor in the familiar sense, the element of relief or vindication was almost invariably present. Laughter was common among the younger children in the radio situations immediately following the climax, when the solution of the story was being unfolded. Thus in the Script Al, after the little dog had escaped, and the family started in pursuit, the children laughed excitedly when the colored cook vociferously demanded its return. The listeners had passively accepted the misfortune of the loss of the dog, and although they suffered almost as acutely as if they had personally sustained the loss, they did not have the opportunity to respond with the character in the story by appealing to father for help, calling to the dog, joining in the pursuit, and the like. The emotional response to this vivid experience, blocked at first by the social situation, finally took the form of a violent discharge of nervous energy in laughter when the character reacted successfully to the experience. Similar non-humorous, non-mirthful laughter took place among the adolescents in the love situations. Here again laughter served as a substitute for types of behavior made impossible by the social confronting the listeners.

Although responses of smiling and laughter were abundant,

especially among the younger children, none of the scripts contained many passages that could be regarded as humorous according to adult standards. Most of the laughter must be accounted for as a form of emotional expression in the exciting situations. The frequent smiles occurred in most instances when the action of the story was pleasing to the listener. In some instances, when rapid and violent action coincided with the use of a fictitious Negro dialect, it was impossible to determine whether the laughter was attributable to emotional agitation or to recognition of humor. Several passages in the W scripts, which were addressed to adults, contained presumably humorous passages which the adolescent boys and girls either did not regard as funny, or failed to comprehend. The scripts did not contain a large enough variety of situations containing humor to permit any generalizations as to what children regard as humorous, but it seems clear that their standards in this respect differ widely from those of adults. Inasmuch as humorous programs avoid many of the objections which may be raised against programs depending exclusively upon action, further study of radio programs containing various types of humor would appear to be highly desirable.

In all the experimental programs presented there was marked evidence of high interest during the opening passage of the program, followed by a sharp decline in visible responses for a considerable period, in many instances continuing until nearly the middle of the program. After the middle of the program the motor responses and changes in facial expression become more frequent and more pronounced. Usually the highest point of interest is reached immediately before the end of the program, after which there is a slight drop.

This trend in the emotional responses runs parallel to the development of the typical radio narrative. The opening sound effects or dialogue are designed to create an attitude of expectancy in the listener either through vigorous auditory stimuli or the abrupt presentation of a setting, or both in combination. Some of the commercial juvenile radio dramas employ such stereotyped introductions as a horse's hoofbeats and the rider's cry, or the cheers of a crowd at a baseball game. Theme music in adult programs serves a similar function. The section of the play immediately following the opening passage has the function of expanding the details of the setting and laying the groundwork of the plot. It

introduces the characters and states the "problem" of the story. At approximately the middle of the program the story moves toward a climax or crisis, usually consisting of a menace or hindrance. The characteristic response of the children at this stage is one of restlessness, tension, and facile expressions suggesting fear, anxiety, or depression. The final stage is the dénouement, or solution of the problem. Here the younger children participate in the action by means of vigorous physical movements and more commonly by vocal sounds and laughter.

To what extent does the general shape of the interest curve just described indicate a perception of the general pattern of the radio story? The record of the children's responses suggests the possibility that a determining factor in emotional expression during radio programs is the individual incident rather than the general outline or continuity of the story. Nearly all the graphs portray a rapid succession of alternate high and low interest points throughout the programs. The general pattern of the story is reflected in slight differences in the frequency of high interest points at various stages of the narrative, but the intensity of the interest as revealed by observable motor responses and changes in facial expression bears no perceptible relation to position in the story. Especially the younger children fail to exhibit steadily rising or falling interest during any large section of the radio play. The response to each new incident seems uninfluenced by the incidents preceding.

These findings confirm the conclusions of Ruckmick and Dysinger in their study of the emotional responses of children to the motion picture situation.

We have noted [they assert], the frequent and almost typical tendency on the part of adolescents and children below the adolescent age to note specific incidents and episodes in an isolated manner. The emotional reactions as recorded by our instruments are to specific incidents in the scenes. . . . The younger the child the more he appreciated and emotionally responded to the separate items in the film and the less he appreciated or even assimilated the continuity of the story¹

These findings, moreover, would seem to harmonize with the general characteristics of children's emotional behavior. According to Groves,

The emotional life of the little child is simple and spontan-

¹W. S. Dysinger, and C. A. Ruckmick, *The Emotional Responses of Children to the Motion Picture Situation*, p. 116. New York: The Macmillan Company, 1933.

eous. His anger is instantly and freely expressed. His fears as well as his joys show themselves at once for there is neither desire nor power on his part to withhold them. Each emotion expresses itself freely with no inner effort of control and is followed by the succeeding emotion which spends itself without any inner protest on the child's part. Each impulse comes and goes without greatly modifying other succeeding impulses. Each merely claims the central place in consciousness for its brief period and then gives way to its successor.¹

The children in the adolescent years, on the other hand, exhibited, in addition to their vivid awareness of individual incidents, a fairly clear sense of the continuity of the story. The cumulative effect of the narrative was commonly reflected in a steady rise of interest in the later phases of the radio dramas. This consciousness of the larger plot patterns was reflected also in the vigorous response noted in the case of surprise endings, which pre-supposed a powerful interest in the relationships which gave the surprise endings significance.

The fictional elements which evoked frequent and vigorous responses were highly diversified, but possessed certain common characteristics. In the case of the younger children, including both the primary children and those in the fifth and sixth grades, the one great desideratum appeared to be action, movement, and conflict. So long as these elements were present, it was possible to secure a vigorous response. In fact, none of the eight programs used in these experiments failed at any time in securing intense interest on the part of the child auditors at least at some considerable period during the program. But in programs that are predominantly conversational, as in the case of Script B1, the excitement points are in nearly all cases the episodes in which there is overt, physical activity.

The introduction of strange, novel, highly stimulating objects, animals, people, or incidents is obviously not necessary to produce strong interest on the part of the child listeners. On the contrary, a program dealing exclusively with familiar incidents from the life of a child was one of the most successful of all those used, even with children in the fifth and sixth grades. The scene of a little dog having his bath and barking at the family cat created great excitement among children in the primary grades, and led a majority of children in grades five and six to express a

¹Ernest R. Groves, Personality and Social Adjustment, p.64. New York: Longmans, Green and Co., 1931.

preference over it to a "Flash Gordon" or "Wild West" story. The factors of recognition and familiarity, either of the object or experience, or of the general topic appear to play a large part in the determination of the child's response.

Familiarity of elements in the fictional situation aid the child in identifying himself with the people or incidents in the story. In the case of the adolescent children in grades seven and eight, the capacity to share vicariously in the action of the radio story extended to conflicts, anxieties, and successes of a non-physical nature. These children were deeply concerned over the fate of an artist who was being underpaid for his masterpieces; they were relieved when the hero rescued the heroine from a watery grave, or when the sheriff arrived in time to save the frontiersman from the murderous rustlers. They gave clear indication of perceiving and caring about broader adult relationships and problems--such problems, for example, as success in making a living. They showed a lively interest in the scenes of romantic love. No essential difference is to be noted between these responses and those of the children on the lower age levels, except that the range of interests has broadened. Arousing strong affective responses to the programs remains in all cases a problem of making the listener enter easily and sympathetically into the situation described.

Getting child interest in radio programs, therefore, is a relatively easy task. Children will listen avidly to radio stories if they have action and conflict, and the more elementary the conflict is the wider the child audience is likely to be. A poor program, with morbid scenes or with inaccurate and misleading portrayals of life is just as likely to elicit strong emotional responses as an artistically prepared program. On the other hand, a skillfully woven story which utilizes the psychological elements that have been demonstrated in these experiments may be just as successful in securing child interest, but much more successful in contributing to the mental growth of the child. Whatever else may be true of radio dramas, they do not need blood and thunder, shrieking sirens and sputtering machine guns, to interest children.

General Summary and Conclusions

The purpose of the experiments utilizing the direct observation technique was to discover what types of radio drama and what

types of specific situations in the radio plays elicit strong affective responses from the children. Two series of experiments were conducted. In the first, the programs were brought to classes of children in schoolrooms from a portable radio studio equipped with broadcasting apparatus. Radio players were recruited from the professional studios and from a local school of expression. An experienced dramatic director was in charge of the production of the radio plays. In the second series of experiments the cooperation of a group of WPA radio players broadcasting from station WCFL was secured. Programs in this series, for which scripts were secured in advance, were presented to pupils from receiving sets in the classrooms. Records for four hundred and eighty-six boys and girls from grades one to eight, in twenty separate audiences, exclusive of a series of preliminary experiments, were taken in all by a total of twenty-five observers.

In the preliminary experiments an effort was made to record children's emotional responses by listing the overt motor reactions of the child listeners. When this procedure proved too cumbersome, observers were instructed to record, opposite each marked passage in the scripts, the serial number of any of twelve typical responses, noted in preceding experiments, which were observed in one or more pupils in the groups assigned to them. Later the procedure was simplified by classifying the responses of children under four general heads, according to the intensity of the response observed. In summarizing the entries, the writer found first the means of the scores assigned to the various marked passages by the observers during each program, then the average of all means assigned each passage in all programs in which the respective scripts were used. Observers were assigned in pairs, sometimes to an individual child, in other cases to a group of three or more children.

Evidence concerning the validity and reliability of the technique was secured in several ways. In experiments in which two contrasting scripts were presented to the same group of children the average of the mean scores of the marked passages of each script were compared with the preference of the class as a whole with respect to the two scripts. In each instance the averages of the mean scores were approximately equal, and the children were almost evenly divided in their preference as to type of program heard. The reliability of the technique was tested by the assignment of pairs of observers to the same group of children during

the presentation of a program in the first series of experiments. The agreement of the pairs of observers assigned in other experiments to one or more pupils was high in some instances, low in others. A study of the curves plotted from the mean scores, however, was favorable to both the validity and the reliability of the technique.

A number of general conclusions may be based upon the data assembled:

(1) Children in all age groups on the elementary level responded actively to all radio plays presented.

(2) Overt motor responses were more frequent and more vigorous among children in the lower age groups than they were among the older children.

(3) Children's laughter during radio programs was more frequently associated with crises in the action of the radio stories and, among adolescent children, with scenes of romantic love than they were with humorous situations.

(4) In the majority of radio programs the curve of interest as determined by the record of children's overt motor responses tended to follow the general pattern of the story: a high point at the beginning, followed by a sharp decline and a steady period of relatively low interest until approximately the middle of the program or the climax of the story, and a fairly steep rise from this point until near the end of the story, where a sudden decline usually took place. When the story ended with an unexpected revelation, an abrupt rise occurred at the end of the interest curve.

(5) In the majority of radio programs the curve of interest as determined by the record of children's overt motor responses revealed an acute awareness of individual incidents and situations in the radio story. Among the younger children the succession of peaks of interest was more pronounced; among the older children the general pattern of the story was more clearly reflected in the curve of interest. On all levels both tendencies were perceptibly in evidence.

(6) Children on all age levels responded to a great diversity of fictional elements. The general characteristics of these fictional elements were action, movement, conflict, and surprise. In the case of the older children the conflict situations to which the listeners responded were both physical and mental. Adolescent children responded vigorously to scenes of romantic love.

(7) Children on the lower age levels responded vigorously to situations familiar in the life of childhood. On all levels the response was strong when identification with the incidents and situations in the story was made easy for the listener.

(8) Type of program as to veracity of detail, morbidity, the presence of fear, and the like, did not affect the relative intensity of the children's responses.

(9) The use of sound effects markedly increased the intensity of the children's responses on the lower age levels. Many individual situations in which irrelevant or only slightly relevant sound effects were introduced did not produce strong responses.

(10) Children's responses during the earlier stages of the majority of the programs more commonly took the form of muscular tension and facial expressions of anxiety or fear, and during the later stages they took the form of grosser physical movements, audible utterances, and laughter. Programs in which there were many minor crises in the action immediately followed by reactions or solutions on the part of the characters tended to elicit the latter type of response throughout.

CHAPTER X

PURPOSE AND PROCEDURES OF THE EXPERIMENTS

The purpose of the experiments in the third phase of the study, as in the second, was to discover the types of stimuli in radio drama which produce vigorous emotional responses in child listeners. An incidental objective was to determine the extent to which typical juvenile radio programs cause profound physiological changes in children. The approach to the problem was by means of established laboratory techniques for the recording of certain bodily changes which characteristically accompany vivid emotional experiences. Changes which were recorded during this series of experiments included circulatory, respiratory, and electrodermal phenomena.

Significance of the Measures

The chief circulatory changes occurring in adjustment to pleasant and unpleasant stimuli are changes in the blood volume in the periphery of the body, systolic and diastolic blood pressure, and heart rate. Although the evidence is somewhat contradictory, in general experiences which are pleasant produce an increase in the blood volume in the periphery of the body, and experiences which are unpleasant produce a decrease in the blood volume in the periphery of the body.¹ With respect to the significance of blood pressure changes no unanimity among investigators exists. A definite relationship has been established, however, between blood pressure changes and conscious deception.² A rise in the heart rate has been found by the majority of investigators to accompany emotional experiences, although a considerable body of evidence points to a retardation in pulse rate in pleasant situations,³ and

¹C. A. Ruckmick, The Psychology of Feeling and Emotion, p. 304. New York: McGraw-Hill Book Co., 1936.

²L. Keeler, "How Science Solves Crime: The Polygraph," Hygeia, X (1932), 740.

³H. Eng, The Emotional Life of the Child, trans. by Morrison, p. 121. Cited in C. A. Ruckmick, op. cit., p. 307.

in the emotion of startle.¹ The responses of the human organism to pleasant and unpleasant situations in the matter of affective changes in circulation are highly complex and interrelated, and the findings thus far, particularly in relatively complex situations, are inconclusive.

Changes in breathing have long been known to reflect emotional experiences. Among the characteristics of the breathing record which may offer clues as to the presence of affective responses are the depth of respiration, the rate of respiration, periods of stress, and so-called I-E (inspiration-expiration) ratio. A great variety of factors, including apparently psychological and physiological conditions within the subject himself, determine the nature of the respiratory changes. Skaggs² reported "a momentary respiratory inhibition followed by a more lengthy period of acceleration" after a series of startles. Landis³ found that electrical stimulation was accompanied by immediate irregularity in breathing, followed by "a deep, gasping thoracic respiration followed by an increasing tendency toward rapid shallow breathing." Ruckmick⁴ summarizes the studies of respiratory changes in response to affective stimuli as follows: .

Most of the studies with pronounced emotional upset show a temporary interruption of the regular respiratory rate, giving (1) a sort of 'gasp' almost immediately on perception of the arousing situation or reception of the stimulation, followed by either (2a) an increased amplitude of respiration at a retarded rate or (2b) a decreased amplitude at an increased rate, and establishing (3) an irregularity in the breathing pattern for several minutes to come.

A vast quantity of material is available in the psychological literature on the electrodermal response (EDR), more commonly known as the psychogalvanic reflex (PGR). The majority of psychologists agree that changes in the electrical resistance of the skin serve as delicate measures of emotional response "when the

¹C. A. Ruckmick, op. cit., p. 305.

²E. B. Skaggs, "Changes in Pulse, Breathing, and Steadiness under Conditions of Startledness and Excited Expectancy," Journal of Comparative Psychology, VI (1926), 303-315.

³C. Landis, "Studies in Emotional Reactions, V: Severe Emotional Upset," Journal of Comparative Psychology, VI (1926), 221-242.

⁴C. A. Ruckmick, op. cit., p. 321.

overt behavior of the subject would not betray the presence of emotion."¹ Variations in skin resistance, produced in response to affectively experienced stimuli, have been measured by the exosomatic technique, i.e., through the measurement of changes in resistance to an externally induced current, and by the endosomatic technique, i.e., through the measurement of an increased electrical potential from the body when no external current is induced.

Explanations of the causes of the electrodermal phenomenon vary. Some writers believe that an electrical current is generated by the nerves themselves.² Others suggest that the resistance changes are caused by the stimulation of the sweat glands with resulting changes in the electrical condition of the skin.³ Darrow has pointed out that the amount of perspiration on the skin tends to vary as the reciprocal of the resistance, or as conductance.⁴ In any case, the source of the innervation resulting in the resistance changes appears to be the autonomic nervous system.

Darrow has offered evidence in support of the view that momentary sensory stimuli are relatively more effective in exciting changes in the galvanic skin reflex, while associative processes or ideas are more effective in increasing pulse rate and blood pressure.⁵ In his judgment the function of the secretory activity of the palms is primarily to "provide a pliable adhesive surface facilitating tactual acuity and grip on objects."⁶ Of particular interest in the present study of children's emotional responses to the radio situation is Darrow's distinction between the changes in the electrodermal response and changes in blood pressure

¹Quoted from Dockeray in ibid., p. 349.

²F. A. Perrin, and D. B. Klein, Psychology--Its Methods and Principles, pp. 178-9.

³R. S. Woodworth, Psychology. 3d. ed., p. 347.

⁴Chester W. Darrow, Studies from the Behavior Research Fund and the Institute for Juvenile Research. Series B, No. 198.

⁵Chester W. Darrow, "Differences in the Physiological Reactions to Sensory and Ideational Stimuli," The Psychological Bulletin, XXVI (1929), 185-201.

⁶Chester W. Darrow, "Neural Mechanisms Controlling the Palmar Galvanic Skin Reflex and Palmar Sweating," Archives of Neurology and Psychiatry, XXXVII (1937), 641-663.

as indicators of emotion. Darrow emphasizes the preparatory function of the skin conductance changes in situations evoking alertness, anticipation, apprehension, tension, and "mobilization for emergency response," but suggests that a rise in blood pressure indicates the presence of psychological "resistance" or blocking, as for example when the safety, integrity, or reputation of the individual is involved. If this distinction is valid, situations in the radio dramas depicting scenes of danger should produce a marked rise in blood pressure in many of the subjects, while situations suggesting rapid action should be accompanied by fairly wide deflections of the galvanometer indicator. Since both elements are present in many of the situations portrayed in radio programs, these two physiological responses should occur simultaneously at many points in the records.

The Apparatus

The radio programs in all the laboratory experiments were presented to the subjects by means of electrical transcriptions obtained through the courtesy of advertising agencies and sponsors of the respective programs employed in the experiments. The equipment for the reproduction of the programs consisted of a six-tube amplifier taken from a General Electric receiving set, a portable loudspeaker, and a phonograph turntable and pickup especially designed for radio transcriptions by the De Vry Manufacturing Company. The equipment included the essential elements of a standard public address system.

The apparatus used for the recording of the subject's bodily changes during the radio programs corresponds in essential particulars to the Behavior Research Photopolygraph.¹ It provided a method for the simultaneous recording of blood pressure changes, changes in pulse rate, respiration changes, skin conductance changes, time marks, and identification symbols on six-centimeter photographic paper. In the earlier experiments blood volume records were taken instead of blood pressure records.

The mechanism for the photographic recording of the various physiological changes consisted of a magazine in which there was

¹Described by Chester W. Darrow in The Journal of General Psychology, VII (1932), 215-219. (The Behavior Research Photopolygraph.)

mounted a roll of six-centimeter photographic paper; a horizontal aperture upon which a beam of light was concentrated; rollers which facilitated the passing of the paper across the aperture; a geared motor which drove the rollers at a constant speed; a striped glass pipette fastened across the aperture to provide horizontal coördinates on the records; an enclosed lamp emitting a ray of light through a horizontal slit; and a light-proof container into which the photographic paper passed after exposure. A timing device was electrically operated to interrupt the beam of light at intervals of one second duration. A telegraph key was used to operate a small flag situated to the side of the horizontal aperture in the magazine containing the roll of photographic paper. This device made it possible to record the identification symbols corresponding to those entered on each page of the radio scripts. The signal and time marks, as well as the continuous records of movements of the indicators of instruments measuring changes in circulation, respiration, and skin conductance, were recorded upon the sensitized paper by the casting of shadows in the path of the beam of light from the lamp mentioned above.

In the majority of experiments a finger plethysmograph, measuring changes in the volume of the finger, was used instead of the sphygmomanometer, which measures changes in blood pressure. The subject's arm was placed on an armrest and the forefinger inserted through an opening in a rubber membrane fitted snugly around the end of a glass chamber. A rubber tube approximately eight feet in length passed from this chamber to a pipette, open at both ends, and fastened across the aperture of the recording camera. A drop of ink, which was diluted with alcohol to facilitate movement, and placed inside the pipette, responded to the changes in pressure in the air column in the rubber tube. The resulting continuous record, created by the shadow cast by the moving drop of ink, reflected not only the changes in the volume of the finger, but the subject's pulse rate as well. Unfortunately the gross movements of the finger, which particularly in the case of younger children could not be wholly suppressed, tended to invalidate the record of changes in blood volume at many points. Often these movements drove the indicator out of range, so that in the time required for the adjustment of the apparatus this part of the record had to be omitted.

A more satisfactory device for the recording of circula-

tory changes is the sphygmomanometer, which was used in the later experiments. The apparatus consisted of a cuff, wound tightly around the subject's leg just above the ankle; a rubber tube proceeding from the cuff through a Y to a dial manometer and to a rubber bulb with which air was pumped into the cuff and the manometer; stoppers to shut out both the bulb and the manometer when the desired pressure was reached, in order to prevent leakage of air; an auxiliary fifteen-flange bellows attached to the system by another branch of the rubber tube; a light three-pronged fork suspended under the auxiliary bellows from a fulcrum transmitting the movements of the bellows to the fork, and so constructed that when the center prong was driven out of recording range either of the other prongs moved into the recording range. Here the record of the movements of the fork appears at the bottom of the photographic strip, but one of the outer prongs has moved partially into the recording range, so that a fragmentary record of the same movements, reflecting both pulse rate and blood pressure, appears at the top of the photographic strip. An initial pressure of approximately sixty millimeters, above the lower diastolic limit and considerably below the upper systolic limit, proved to be adequate for the recording of pressure changes and sufficiently comfortable for the majority of the subjects.

Respiratory changes were recorded by means of a pneumograph, consisting of a drum or double capsule containing a coiled spring and joined at the circumference by means of a canvas casing. A rubber tube, attached to one side of the drum, passed to a recording tambour mounted before the aperture in the recording camera. The pneumograph was placed upon the subject's chest and fastened by means of a belt passed around the body. When the chest expanded, the air was partially exhausted from the drum and caused the inflation of the membrane of the tambour. The alternate inflation and deflation of this membrane produced the movements of the tambour pointer which cast its shadow upon the sensitized paper.

The apparatus used in the recording of electrical changes on the skin consisted of a Behavior Research Resistance Box,¹

¹Described by Chester W. Darrow in his article, "Uniform Current for Continuous, Standard Unit Resistance Records," The Journal of General Psychology, VI (1932), 471-78.

galvanometer, and electrodes. A switch was provided to introduce the subject into the circuit, and another to shut out the galvanometer while the subject was introduced. After the subject was introduced into arm X of the bridge, compensation was made by reducing the variable resistances until the bridge was once more in balance. Two dry cells with a combined voltage of 4.5 volts supplied the external potential for the circuit. Since all resistance save that represented by the subject were kept constant during the radio programs, deflections from the original reading of zero on the galvanometer were attributable to changes in the electrical condition of the skin or in the electrodes themselves.

Built into the resistance box was a sensitive type of D'Arsonval galvanometer, with the pointer vertically extended by means of a light strip of paper glued to it for use in the shadow-graph recording. In order to protect the indicator from currents of air in the room, a copper case (J) fitted with glass windows on two sides to permit the light to pass through the aperture of the recording case was mounted over the dial of the galvanometer.

The electrodes used in the majority of the experiments were installed on an armrest placed on a table to the right of the subject. The positive electrode, upon which the subject rested the palm of his hand, consisted of a zinc disk heavily coated with kaolin paste to prevent polarization and covered with a pad of absorbent cotton soaked with a concentrated solution of zinc sulphate. The other electrode was applied to the back of the subject's hand. In later experiments the positive electrode consisted of a zinc disk coated with a paste of saturated zinc sulphate kaolin, covered with a circular disk of absorbent paper. The electrode was fastened to the subject's hand with a leather strap which passed over a sponge rubber pad placed on the back of the subject's hand. The negative electrode was fastened in a similar manner to the upper side of the subject's forearm.

The Procedure in the Laboratory

The majority of the subjects employed in the experiments were pupils from the Parker Practice School, on the campus of the Chicago Normal College. A few subjects were secured from the Christopher School for Crippled Children, one of the Chicago public schools, for the records with children suffering from various heart ailments. A few students from the Chicago Normal College and

teachers in the Chicago public schools also participated in the study as listeners to radio programs. In all, one hundred and forty-eight records were taken. No subject listened to more than two fifteen-minute programs during a single experiment.

Children who were to be used in the experiments were told that they would hear a radio program and that they would be asked afterward whether they had liked it and what parts they had liked best. When the electrodes, blood pressure cuff, and pneumograph were attached to the subject, an effort was made with the younger children to represent the process as a new kind of game that could tell how a boy or girl felt when he listened to a radio program. In general, the younger children exhibited less apparent apprehension with reference to the attachments than did the older children. The apparatus itself, with the exception of the loud speaker, was hidden from the subject's view by means of a screen. In every case the subject was allowed to remain seated with the attachments on for several minutes before records were taken. The majority of pupils reported afterward that they forgot the attachments soon after the radio program began. In most instances a parent, brother, sister, or friend sat nearby while the program was in progress. At the close of each program a record was taken as to the pupil's own testimony concerning his reactions during the program. Almost invariably the pupil could tell only those episodes in the story which appealed to him most. The older children frequently noted from some chance remark or announcement made in the program that it must have been a transcription rather than an original broadcast.

During each of the programs the writer or an assistant operated the telegraph key which recorded the identification symbols upon the record paper. Each of the scripts corresponding to the electrical transcriptions employed in the experiments was divided into passages of approximately equal length and identified by means of symbols placed directly opposite the dialogue. Interruptions in the beam of light at intervals indicated in the script enabled the writer to identify any point or area in the continuous photographic record by reference to the typewritten script.

CHAPTER XI

ANALYSIS OF THE PHOTOPOLYGRAPH RECORDS

The summary tables in this chapter contain the data for the changes in respiration and the electrodermal response, as recorded for eight of the electrical transcriptions employed in the experiments. Records taken in connection with several other programs have been ignored in these summaries because the number of cases in each instance was too small to warrant generalizations. In the case of the EDR records, attention was given to the relative frequency of the deflections rather than their intensity. Since the purpose of the experiments was to isolate those passages which evoked the greatest response in the subjects, a simple tabulation of the number of deflections was adequate for the study. The wide individual differences in the responses would have made a study of relative intensity fruitless for the purposes of this experiment.

Data concerning circulatory changes were confined to variations in pulse rate, taken from the records at three points in the programs. The blood volume records were unsatisfactory at several points on most of the records and could therefore not be used for purposes of comparison. Such data as rate of respiration and I/E ratio were also omitted from these tables. They have been included along with the data on circulatory changes in the individual case studies. Respiratory changes as summarized in this chapter refer to obvious departures from the regular pattern of the respiration wave and to periods of tension.

Reference has been made in Chapter X to the evidence concerning the significance of respiratory disturbance as an indicator of emotional response. The chief problem encountered in the interpretation of the respiration records is the identification of periods of disturbance due to emotional response as distinguished from those caused by other factors. In this study it has been assumed that when irregular breathing patterns tended to concentrate at given reading points, in contrast with prevailingly regular breathing patterns at other points in the program, the disturbances were produced by the dramatic passages in question. In order to isolate

the qualities responsible for the emotional disturbances, a comparison was made between passages with frequencies falling within or above the interval containing the upper quartile and those with frequencies falling within or below the interval containing the lower quartile. Thus in Ace Williams 5, for example, respiratory disturbances were recorded at fourteen (twenty-seven per cent) of the fifty-two reading points in ten or more cases (from a total of twenty-four). On the other hand, respiratory disturbances were recorded in fewer than six cases at twelve (twenty-three per cent) of the fifty-two reading points. Comparison was therefore made between the passages corresponding to these two groups of reading points.

Summary of Children's Responses
For All Programs

In the case of several of the programs, differences were noted between the frequency of the EDR changes and the frequency of respiration changes during various types of situations portrayed in the programs. In Table 57 the average number of changes of both classifications are given, along with the differences between the two and the P. E.'s of the differences. These data indicate clearly that the mean number of respiration changes for all programs and all types of passages taken together is almost exactly equal to the mean number of EDR changes. Nor can any distinction be made between types of passages with relation to tendency to produce EDR or respiration changes. In the case of adventure passage, the EDR changes exceed the respiration changes (by .436), but the difference is not significant (less than twice the P.E. of the difference). On the other hand, in the case of the danger passages, the respiration changes exceed the EDR changes (by .369), but here again the difference is not significant (less than twice the P.E. of the difference). The greatest difference may be noted in the case of the conflict passages (.778), but since it is less than three times the P. E. of the difference, it probably cannot be regarded as reliable.

Further comparison of the respiration and EDR changes reveals that a fairly significant correlation exists between the two types of responses. For all the passages taken together, the correlation was .59, and in the case of all but two of the seven types of passages the correlation between respiration and EDR changes was .50 or higher. Correlation between the two responses was

TABLE 57

COMPARISON OF RESPIRATION AND EDR RESPONSES
FOR VARIOUS TYPES OF PASSAGES¹

Type of Passage	N	ΣR	ΣEDR	M_R	M_{EDR}	$M_R - M_{EDR}$	PEdiff ($M_R - M_{EDR}$)	rREDR
1. Action	54	309	206	4.019	3.815	+.204	.308	.70
2. Adventure ..	82	262	298	3.195	3.634	-.436	.286	.58
3. Commercial .	40	132	130	3.300	3.250	+.050	.253	.63
4. Conflict ...	36	87	115	2.417	3.194	-.778	.285	.22
5. Danger.....	108	456	415	4.222	3.843	+.379	.249	.60
6. Exposition .	32	68	76	2.125	2.375	-.250	.270	.37
7. Mystery	24	87	82	3.625	3.417	+.208	.553	.50
All Passages.	376	1309	1322	3.481	3.516	-.035	.105	.59

¹The formula employed for the determination of the P.E. of the differences between the means of R (respiration) and EDR (electrodermal response) is as follows:

$$PEdiff_{M_R - M_{EDR}} = \sqrt{PE^2_{M_R} + PE^2_{M_{EDR}} - 2\sqrt{R \cdot EDR} PE_{M_R} PE_{M_{EDR}}}$$

(From Dennis H. Cooke, Minimum Essentials of Statistics, p. 106. New York: The Macmillan Co., 1936).

The formula for r is:

$$r_{R \cdot EDR} = \frac{\sigma_R}{2\sigma_{EDR}} + \frac{\sigma_{EDR}}{2\sigma_R} - \frac{\Sigma(R-EDR)^2 - (M_R - M_{EDR})^2}{2\sigma_R \sigma_{EDR}}$$

(From W.S. Monroe, and M. D. Engelhart, The Scientific Study of Educational Problems, p. 95. New York: The Macmillan Co., 1936).

closest (.70) in the case of the action passages, and lowest (.22) in the case of the conflict passages. The two types of passages in which the correlation was lowest (conflict and exposition) were also the two lowest in total number of EDR and respiration changes. In the case of the danger passages, in which the largest number of respiration and EDR changes were noted, the correlation was .60.

Tables 58 and 59 contain the differences, with the P.E.'s of the differences, between the means of the various types of passages in the matter of respiration and EDR changes. The type of passage producing the highest mean number of respiration changes is in the danger scene, with action passages running a close second,

TABLE 58

DIFFERENCES OF MEANS, WITH PROBABLE ERRORS, OF RESPIRATION
RESPONSES FOR VARIOUS TYPES OF PASSAGES¹

	1. Action	2. Adventure	3. Commercial	4. Conflicts	5. Danger	6. Exposition	7. Mystery	8. All Passages
1. Action .....	.....	.824	.719	1.602	-.203	1.894*	.394	.634
M=4.019	.....	+ .348	+ .341	+ .341	+ .342	+ .344	+ .507	+ .289
2. Adventure ..	-.824	.....	-.105	.778	-1.027	1.070	-.430	-1.090
M=3.195	+ .348	.....	+ .302	+ .302	+ .303	+ .305	+ .482	+ .241
3. Commercial .	-.719	-.105	.....	.883	-.922	1.175*	-.325	-.085
M=3.300	+ .341	+ .302	.....	+ .293	.295	+ .297	+ .476	+ .230
4. Conflict ...	-1.602*	-.778	-.883	.....	-1.805*	.292	-1.208	-.968*
M=2.417	+ .341	+ .302	+ .293	.....	+ .295	+ .297	+ .476	+ .230
5. Danger	.203	1.027	.922	1.805*	.....	2.097*	.597	.837
M=4.222	+ .342	+ .303	+ .295	+ .295	.....	+ .298	+ .477	+ .232
6. Exposition .	-1.894*	1.070	-1.175*	-.282	-2.097*	.....	1.500	-1.260*
M=2.125	+ .344	+ .305	+ .297	+ .297	+ .298	.....	+ .479	+ .235

TABLE 58--Continued

	1. Action	2. Adventure	3. Commercial	4. Conflicts	5. Danger	6. Exposition	7. Mystery	8. All Passages
7. Mystery	-.394	.430	.325	1.208	-.597	1.500	.....	.240
M=3.625	±.507	±.482	±.476	±.476	±.477	±.479	.....	±.440
8. All Passages	-.634	.190	.085	.968*	-.837	1.260*	-.240	.....
M=3.385	±.289	±.241	±.230	±.230	±.232	±.235	.440	.....

¹The formula employed for determining the differences between the various means is:

P.E.diff. = $PE^2Mr()$ PE²Mr () (from Dennis H. Cooke, op. cit., p. 99). Starred figures represent differences equivalent to approximately four or more P.E.'s.

TABLE 59

DIFFERENCES OF MEANS, WITH PROBABLE ERRORS, OF E.D.R.
RESPONSES, FOR VARIOUS TYPES OF PASSAGES¹

	1. Action	2. Adventure	3. Commercial	4. Conflicts	5. Danger	6. Exposition	7. Mystery	8. All Passages
1. Action .....	.....	.181	.565	.621	-.028	.440*	.398	.385
M=3.815	.....	±.375	±.356	±.352	±.348	±.348	±.548	±.217
2. Adventure ..	-.181	.....	.384	.440	-.209	1.259	.217	.204
M=3.634	±.375	.....	±.339	±.335	±.330	±.330	±.537	±.274
3. Commercial .	-.565	-.384	.....	.056	-.593	.875	-.167	-.180
M=3.250	±.356	±.339	.....	±.315	±.310	±.310	±.524	±.249
4. Conflict ...	-.621	-.440	-.056	.....	.649	.819	-.223	-.236
M=3.194	±.352	±.335	±.315	.....	±.305	±.305	±.521	±.243
5. Danger	.028	.209	.593	.649	.....	1.468*	.426	.413
M=3.843	±.348	±.330	±.310	±.305	.....	±.300	±.519	±.237
6. Exposition .	-1.440*	-1.259	-.875	-.819	-1.468*	.....	-1.042	-1.055*
M=2.375	±.348	±.330	±.310	±.305	±.300	.....	±.519	±.237

TABLE 59

	1. Action	2. Adventure	3. Commercial	4. Conflicts	5. Danger	6. Exposition	7. Mystery	8. All Passages
7. Mystery ...	-.398	-.217	.167	.223	-.426	-1.042	.....	-.013
M=3.417	+ .548	+ .537	+ .524	+ .521	+ .519	+ .519	.....	+ .485
8. All Passages	-.385	-.204	.180	.236	-.413	+ 1.055*	.013	.....
M=3.516	+ .217	+ .274	+ .249	+ .243	+ .237	+ .237	+ .485	.....

¹The formula employed for determining the differences between the various means is:

$P.E.diff. = P.E.^2_{me.d.r.()} P.E.^2_{me.d.r.()}$ (from Dennis H. Cooke, op. cit., p. 99). Starred figures represent differences equivalent to approximately four or more P.E.'s.

mystery scenes appear third, commercial fourth, adventure fifth, conflict sixth, and exposition seventh. No type of passage exceeded the mean for all passages sufficiently to be regarded as significantly higher than the mean for all passages, if we are to regard a difference of less than four P.E.'s as not reliable. Two types of passages (conflict and exposition), however, were significantly lower than the mean for all passages in number of respiration changes produced. These types were significantly lower than the commercial passages. Conflict passages produced fewer respiration changes than did commercial passages, but the difference was equivalent to only three P.E.'s. So far as EDR changes are concerned (Table 59), the only significant difference occurred in the case of the expository passages, which ranked significantly lower than the action and danger passages and significantly lower than the mean for all the passages together.

In so far as the classification of the passages into these types is valid, then, we may conclude that scenes of action and danger such as are found in the programs used in these experiments tend to produce a greater emotional response as measured by respiration and EDR changes than do the kind of conflict scenes and expository passages found in the radio programs used in these experiments.

CHAPTER XIV

SUMMARY AND CONCLUSIONS

Experiments were conducted in the laboratories of the Department of Education of the University of Chicago with boys and girls ranging in age from eight to twenty years. The purpose of the experiments was to discover the types of situations in radio drama which produce emotional responses in child listeners. Children's responses were measured through a study of continuous records of circulatory, respiratory, and electrodermal changes occurring during the programs. The apparatus for the reproduction of the programs consisted of electrical transcriptions of juvenile radio programs, a phonograph turntable and pickup, a radio amplifier, and a portable loudspeaker. The apparatus for the recording of the physiological changes consisted of a pneumograph for the recording of respiratory changes, a sphygmomanometer for the recording of pulse rate and blood pressure changes, a form of the Behavior Research Resistance Box for the recording of electrodermal changes, and a camera for the photographing of movements of the various indicators by means of shadows cast in the path of a beam of light. Altogether 148 records were taken.

Analyses of the photopolygraph records were made separately for the various programs used in the study, for age and sex groups, and for individual cases. General conclusions based upon evidence presented in Chapters XI through XIII follow:

(1) Wide individual differences in emotional responses to situations in radio drama were found among children of all age levels and of both sexes.

(2) Emotional responses of children in age groups from eight to eleven years, as measured by number of EDR changes and respiration changes, were more numerous than they were in the higher age groups.

(3) In two programs of action and adventure, in which a representative number of cases and a comparable number of boys and girls were used, the girls exceeded the boys slightly in the number of respiration and EDR changes and in the mean variation in

pulse rate. For all the programs used in the experiments, the girls exceeded the boys in the mean number of EDR changes and in the mean variation in pulse rate, but not in respiration changes.

(4) Passages involving direct narration as distinguished from the dramatized portions produced at least as many EDR and respiratory changes as did the average passage for the program in which they appeared.

(5) Action and danger scenes exceeded all other types of situations in the radio programs in the matter of EDR and respiration changes, but they did not significantly exceed the means for all passages taken together.

(6) Conflict scenes and expository passages ranked significantly lower in number of respiration changes produced than action and danger passages, and lower than the mean for all passages. With respect to EDR changes, expository passages ranked significantly lower than the action and danger passages and significantly lower than the mean for all the passages taken together.

(7) Wide differences in number of respiration changes during scenes of danger from essentially the same plot situation suggest that the sequence and position of the incidents determine emotional response as much as does the nature of the incident itself.

(8) In one program, in which there was an uninterrupted series of adventure scenes (action in which the safety or welfare of the central characters was not directly involved), the adventure scenes did not appear in the upper or lower quartile with respect to respiration changes, while danger scenes appeared in both.

(9) In a program containing many supernatural situations, passages dealing with supernatural elements exceeded the mean of all passages in the program with respect to EDR and respiration changes. No passage of this type appeared in the lower quartile and several appeared in the upper quartile with respect to both EDR and respiration changes.

(10) Commercial passages ranked above adventure scenes, conflict scenes, and expository passages in the number of respiration changes produced, but the differences in the means were not great enough to be statistically significant (Table 57).

(11) Commercial passages in one program in which advertising matter was dramatized ranked higher in respiration and EDR

changes than the mean for the passages of the program as a whole; while in another program, in which the advertising matter was presented directly with a threat to remove the program from the air if listeners did not purchase the sponsor's product, the commercial passages ranked low.

(12) In a program in which several of the commercial passages included references to the listeners' mother, those containing such references ranked high in the number of respiration changes or EDR changes, or both.

(13) In a program series containing passages offering free premiums to listeners, such passages ranked well above the mean for all the passages in the program, in the matter of respiration changes.

(14) In the same program series, passages dealing with club business and ritual ranked low in the number of EDR and respiration changes.

(15) Very few of the passages in all the programs studied contained references to familiar human relationships such as love, family pride, friendship, reconciliation, and the like. Those which were present ranked high in the number of respiration and EDR changes.

(16) Instances of physiological tensions in the radio dramas as illustrated by situations of non-physical conflict produced a greater number of EDR and respiration changes than did instances of physical danger and combat in the same programs.

(17) While there was no significant difference between the mean number of respiration changes and the mean number of EDR changes for the various types of passages and for the passages of all types taken together (Table 57), the mean number of EDR changes was substantially higher than the mean number of respiration changes in the case of a program built around supernatural and magical elements.

(18) Fairly high correlations were found between EDR and respiration changes in the case of the majority of types of passages and in all passages taken together.

(19) Records of physiological changes during the radio programs taken for cardiac patients revealed no characteristics different from those of other records taken in the experiments.

(20) In the limited number of individual cases studied there was no discernible relation between temperament, social

adjustment, and personality type, on the one hand, and the frequency or intensity of emotional response to the radio program, on the other. A child who was found to be irritable and impulsive in his general behavior, for example, registered few emotional responses; while another child who gave no evidence of excitability in his general behavior registered frequent and intense emotional responses during the radio program.

Perhaps the most obvious implication of these findings is the great diversity of situations to which children respond emotionally. A crouching lion in the midst of the jungle will produce a strong emotional response, but so will a grateful little boy telling his sister how much he thinks of her. A man making a ludicrous attempt to reach an exceptionally high note when he is clearly not a good singer will produce as great an emotional effect as a plane going into a tailspin. Blood and thunder is effective, but clearly not essential to a radio program to which children will respond.

Evaluation of a radio program in terms of these findings is a difficult task. Is a program which causes few changes in respiration, skin conductance, pulse, and blood pressure superior to one which causes many such changes? No categorical answer can be given to this question. It is the function of fiction and of drama to produce not only intellectual comprehension but particularly emotional experiences and attitudes. A program which at no point produces evidence of emotional response is not likely to be successful from any point of view. On the other hand, a program which produces violent changes in blood pressure, pulse rate, and respiration, as certain programs used in this study did, is likely to intervene with the normal emotional growth if not with the physical health of child listeners. Restraint and moderation in the use of incidents and situations which are known to produce violent emotional reactions is probably desirable for all programs. The temperament and emotional stability of individual children must determine in each case whether a radio listening experience is likely to be harmful.

The general evaluation of children's radio programs lies outside the scope of this investigation. The evidence presented in preceding pages suggests strongly that radio drama of all kinds is capable of producing emotional responses. A series of rather violent stimuli in a radio play completely devoid of intellectual

or esthetic values will produce responses at least as violent as will a carefully prepared program containing a riches of educational elements. The problem of evaluation is both social and psychological.

In this connection, a problem which was touched upon only incidentally in this study is the extent to which enjoyment of a radio play depends upon the type of emotional responses which are measurable in terms of respiratory, circulatory, or electrodermal changes. It is conceivable that certain types of radio plays can afford strong and genuine satisfactions which will make the listener desire more of the same type without at the same time producing the physiological changes described. Evidence on this question will probably need to be secured with the aid of new radio plays not now available on the air.

